

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

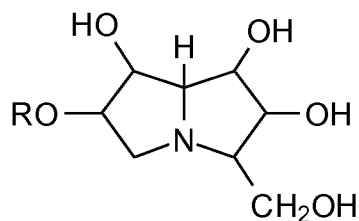
Listing of Claims:

1-87 (canceled)

88. **(currently amended)** A method of ~~immunotherapy~~ vaccination comprising administering to a patient in need thereof a combination of ~~an alkaloid~~ a polyhydroxylated pyrrolizidine alkaloid, a neoantigen and a toll-like receptor ligand wherein the polyhydroxylated pyrrolizidine alkaloid induces at a dose sufficient to induce IL-2 production in dendritic cells in the patient.

89. – 93. **(canceled)**

94. **(currently amended)** The method of claim 88 wherein the polyhydroxylated pyrrolizidine alkaloid has the formula:

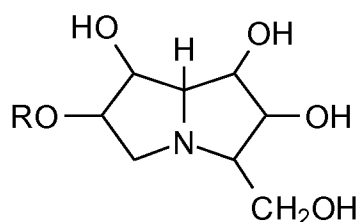


wherein R is selected from the group comprising hydrogen, straight or branched, unsubstituted or substituted, saturated or unsaturated acyl, alkyl (e.g. cycloalkyl), alkenyl, alkynyl and aryl groups, or a pharmaceutically acceptable salt ~~or derivative~~ thereof.

95. (canceled)

96. **(withdrawn)** A live cell vaccine comprising an alkaloid and dendritic cells.

97. **(withdrawn)** The vaccine of claim 96 wherein the dendritic cells are antigen-pulsed dendritic cells.
98. **(withdrawn)** The vaccine of claim 96 further comprising T cells.
99. **(withdrawn)** The vaccine of claim 97 further comprising T cells.
100. **(withdrawn)** The vaccine of claim 98 wherein the T cells are primed by contact with dendritic cells.
101. **(withdrawn)** The vaccine of claim 99 wherein the T cells are primed by contact with dendritic cells.
102. **(withdrawn)** The vaccine of claim 100 wherein the T cells are primed by contact with antigen-pulsed dendritic cells.
103. **(withdrawn)** The vaccine of claim 101 wherein the T cells are primed by contact with antigen-pulsed dendritic cells.
104. **(withdrawn)** The vaccine of claim 103 wherein the alkaloid is a piperidine, pyrroline, pyrrolidine, pyrrolizidine, indolizidine or nortropane alkaloid.
105. **(withdrawn)** The vaccine of claim 96 wherein the alkaloid is polyhydroxylated.
106. **(withdrawn)** The vaccine of claim 105 wherein the alkaloid has the formula:



wherein R is selected from the group comprising hydrogen, straight or branched, unsubstituted or substituted, saturated or unsaturated acyl, alkyl (e.g. cycloalkyl), alkenyl, alkynyl and aryl groups, or a pharmaceutically acceptable salt or derivative thereof.

107. **(withdrawn)** A vaccine comprising a neoantigen, an alkaloid and a toll-like receptor ligand.

108. **(new)** The method of claim 88, wherein the polyhydroxylated pyrrolizidine alkaloid is selected from the group consisting of:

- (a) casuarine;
- (b) casuarine-6- α -D-glucoside;
- (c) 3,7-diepi-casuarine;
- (d) 7-epi-casuarine;
- (e) 3,6,7-triepi-casuarine;
- (f) 6,7-diepi-casuarine;
- (g) 3-epi-casuarine;
- (h) 3,7-diepi-casuarine-6- α -D-glucoside;
- (i) 7-epi-casuarine-6- α -D-glucoside;
- (j) 3,6,7-triepi-casuarine-6- α -D-glucoside;
- (k) 6,7-diepi-casuarine-6- α -D-glucoside; and
- (l) 3-epi-casuarine-6- α -D-glucoside

or pharmaceutically acceptable salts thereof.

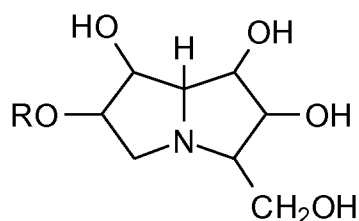
109. **(new)** The method of claim 88, wherein the neoantigen is selected from a group consisting

of:

- (a) tumor-associated antigen;
- (b) an antigen expressed upon viral infection;
- (c) an antigen expressed upon bacterial infection;
- (d) an antigen expressed upon protozoal infection.

110. **(new - withdrawn)** A vaccine comprising a neoantigen, a polyhydroxylated pyrrolizidine alkaloid and a toll-like receptor ligand.

111. **(new - withdrawn)** The vaccine of claim 110 wherein the polyhydroxylated pyrrolizidine alkaloid has the formula:



wherein R is selected from the group comprising hydrogen, straight or branched, unsubstituted or substituted, saturated or unsaturated acyl, alkyl (e.g. cycloalkyl), alkenyl, alkynyl and aryl groups, or a pharmaceutically acceptable salt thereof.

112. **(new - withdrawn)** The vaccine of claim 110, wherein the polyhydroxylated pyrrolizidine alkaloid is selected from the group consisting of:

- (a) casuarine;
- (b) casuarine-6- α -D-glucoside;
- (c) 3,7-diepi-casuarine;
- (d) 7-epi-casuarine;
- (e) 3,6,7-triepi-casuarine;
- (f) 6,7-diepi-casuarine;
- (g) 3-epi-casuarine;

- (h) 3,7-diepi-casuarine-6- α -D-glucoside;
- (i) 7-epi-casuarine-6- α -D-glucoside;
- (j) 3,6,7-triepi-casuarine-6- α -D-glucoside;
- (k) 6,7-diepi-casuarine-6- α -D-glucoside; and
- (l) 3-epi-casuarine-6- α -D-glucoside;

or pharmaceutically acceptable salts thereof.

113. **(new - withdrawn)** The vaccine of claim 110, wherein the neoantigen is selected from a group consisting of:

- (a) tumor-associated antigen;
- (b) an antigen expressed upon viral infection;
- (c) an antigen expressed upon bacterial infection;
- (d) an antigen expressed upon protozoal infection.